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(54) **Chuck for tools.**

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(73) Proprietor: **YUKIWA SEIKO INC.**
No. 2600-1, Oaza-Chiya-ko
Ojiya-shi Niigata-ken(JP)

(72) Inventor: **Sakamaki, Iwao**
No.3, Chuodori
Ojiya-shi Niigata-ken(JP)

(74) Representative: **Bianchetti, Giuseppe**
Studio Consulenza Brevettuale Via Rossini, 8
I-20122 Milan (IT)

Rank Xerox (UK) Business Services
(3.10/3.6/3.3.1)

Description

This invention relates to a chuck for tools according to the preamble of claim 1.

Description of the Prior Art

An example of a conventional type of chuck for tools has been known as disclosed in Japanese Patent Publication No. 55-25002 (U.K.P. No. 1468639) and will be explained herein with reference to Fig. 1 in the accompanying drawings.

This prior art chuck has a main body 1 and in the forward end portion of the main body 1, a center hole 4 is bored which extends axially in order that the shank of a tool T is received in the center hole 4. This center hole 4 branches at equal angular intervals to a plurality of (typically three) slanting holes 5 which extend obliquely toward the rear of the chuck, and jaws 2 are slidably inserted in the slanting holes 5.

Each jaw 2 has, at its forward end, an inner surface 6 which extends in parallel with the axis line of the main body 1, and when the jaws 2 are advanced forwardly (to the left in the illustration), they clamp the tool T as shown in Fig. 1. Threaded on the rearward outer surface of each jaw 2 is a male screw 7 which meshes with a female screw 8 of a rotary member 3 rotatably received in an annular groove 9 formed in the main body 1. The rotary member 3 is formed, at its forward end, with a bevel gear 10. The main body 1 has a radial blind hole 11.

With the chuck for tools constructed as above, in order to move the jaws 2 within the main body 1, a tip end shape 12 of a handle 13 is inserted to the blind hole 11 to bring a bevel gear 14 of the handle 13 into meshing engagement with the bevel gear 10 and the rotary member 3 is then rotated by rotating the handle 13. This rotation of the rotary member 3 cooperates with the screws 7 and 8 to move the jaws 2 along the slanting holes 5, so that the tool T may be clamped by the jaws 2 when they are advanced and released from the jaws 2 when they are retreated.

This prior art chuck for tools needs the separate handle 13, independent of the chuck per se, for the purpose of moving the jaws 2 and it is impossible to move the jaws 2 without using the handle 13. If the handle 13 is lost or can not be found at hand, one may try to clamp or release the tool T by rotating the rotary member 3, but the rotary member 3 may only be rotated together with the main body 3 and the trial may be done in vain, indicating a failure to acccomplish the intended purpose.

US-A- 1,513,332, according to which the preamble of independent claim 1 has been drafted, describes a chuck for tools which can be operated by hand to clamp or release the tool. However, such device is very complex in structure as it provides e.g. three sets of bearing balls between relevant rotatable parts. Furthermore, the arrangement disclosed in such document cannot guarantee a firm and stable clamping of the tool.

SUMMARY OF THE INVENTION

An object of this invention is to eliminate the disadvantages of the prior art chuck for tools and to provide a chuck for tools which can be operated by itself without resort to any tools independent of the chuck to move the jaws so as to clamp or release a tool.

Another object of this invention is to provide a chuck for tools in which the relative rotation between a first and a second grip can be effected by a relatively small force, providing a tight clamping of the tool. Such objects are achieved by the features listed in the appended claim 1.

With the chuck for tools constructed above, the jaws can be advanced or retreated within the slanting holes in the main body with the aim of clamping or releasing the tool by relatively rotating the first grip of main body gripped by one hand and the second grip of rotary member gripped by the other hand in one direction or in the direction reverse thereto. This relative rotation causes the female screw of the rotary member to rotate relative to the main body and the male screws, in meshing engagement with the female screw, of the jaws axially slidably inserted in the slanting holes in the main body act to cause the jaws to advance or retreat.

As is clear from the above, the chuck for tools in accordance with the invention does not require any operation tools independent of the chuck, such as the handle used conventionally, for the sake of moving the jaws, and the chuck per se can readily be operated by hand to clamp the tool securely or to release the tool, as the bearing balls considerably reduce friction between the relatively rotatable opposing surfaces.

Still another object of this invention is to provide a chuck for tools in which the tool once clamped by the jaws can automatically be clamped more strongly by merely continuing rotating the second grip in the same direction for clamping.

To accomplish this further object, the rotary member and the second grip are coupled together by means of a coupling member made of a resilient material and when a reaction force of tool clamping force generated in the course of the rotation of the second grip is transmitted to the rotary member, the coupling member releases the rotary member from coupling to the second grip

and the rotary member undergoing release from coupling stops rotating and displaces rearwardly. A pusher member making surface contact to part of the first grip is interposed between the first and second grips and when the rotation of the second grip continues during the displacement of the rotary member, the pusher member causes the rotary member to displace forwardly. Thus, upon generation of the reaction force of tool clamping force, the rotation of the rotary member is stopped but a rearward pushing force is generated to permit the pusher member to rotate together with the second grip. This rotation of the pusher member causes the pusher member to advance forwardly and an advancing force is transmitted to the jaws through the rotary member to cause the jaws to clamp the tool more strongly.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a longitudinally sectional front view illustrating a typical example of prior art chuck for tools.

Figure 2 is a sectional view, taken on the line 2 – 2 of Figure 3 and viewed in the direction of arrow, showing a chuck for tools according to a first embodiment of the invention.

Figure 3 is a left side view of the Fig. 2 embodiment.

Figure 4 is a longitudinally sectional front view illustrating a chuck for tools according to a second embodiment of the invention.

Figure 5 is a sectional view taken on the line 5 – 5 of Figure 4 and viewed in the direction of arrow.

Figure 6 is an enlarged sectional view illustrating essential part of the second embodiment placed in clamping condition.

Figure 7 is a fragmentary sectional view taken on the line 7 – 7 of Figure 6.

Figure 13 is a longitudinal sectional front view illustrating a chuck for tools according to a third embodiment of the invention.

Figure 14 is a sectional view, taken on the line 14 – 14 of Figure 13 and viewed in the direction of arrow, showing the second grip of the Fig. 13 embodiment.

Figure 15 is a longitudinal sectional front view illustrating a chuck for tools according to a fourth embodiment of the invention.

Figure 16 is a left side view of the Fig. 15 embodiment.

Figure 17 is a sectional view, taken on the line 17 – 17 of Figure 15 and viewed in the direction of arrow, showing a buffer cylinder of the Fig. 15 embodiment.

Figure 18 is a enlarged view showing a portion surrounded by line 18 in Figure 15.

Figure 19 is a view showing the Fig. 18 portion placed in different operational condition.

Figure 20 is a developed plan view showing part of the buffer cylinder of the Fig. 15 embodiment.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Figures in the accompanying drawings following Fig. 2 inclusive illustrate first to fourth embodiments of the invention and in these figures, members used in common for these embodiments and similar to those of the prior art example will be designated by the same reference numerals as used in Fig. 1 and only the other different members will be designated by different reference numerals.

In the first embodiment as shown in Figs. 2 and 3, a main body 1 has a rear shaft 25, and a cylindrical first grip 17 has its flat bottom integrally connected to the rear shaft 25 and its outer circumferential periphery formed with a great number of axial recesses 18.

An annular groove 9 is formed in the main body 1, and in forward part of the annular groove 9, there is disposed a rotary member 19 consisting of a plurality of divided segments which are put together by means of a hoop 20 and in rearward part of the annular groove 9, there is disposed an annular seat 22. A number of bearing balls 21 are received in annular grooves respectively formed in the two members 19 and 22. The inner wall of each segment of the rotary member 19 is threaded with a female screw 8 which meshes with a male screw 7 threaded on each jaw 2, and a cylindrical second grip 23 is securely connected to the rotary member 19 through the medium of the hoop 20. The second grip 23 has its rear end which is loosely fitted in a cavity of the first grip 17, providing for a gap between grips 17 and 23, and has its outer circumferential periphery formed with a number of axial grooves 24.

In this embodiment, when clamping or releasing a tool T, the first grip 17 is gripped by one hand and the second grip 23 is gripped by the other hand and thereafter the two grips 17 and 23 are relatively rotated in one direction or in the direction reverse thereto. Since the female screw 8 threaded on the rotary member 19 is in meshing engagement with the male screws 7 on the jaws 2, this relative rotation causes the jaws 2 to advance or retreat depending upon the direction of rotation of the rotary member 19.

Thanks to be bearing balls 21 interposed between the rotary member 19 and the seat 22 forming part of the main body 1, the rotary member 19 can be rotated lightly.

Figs. 4 to 7 show a second embodiment of the invention.

A first grip 27 in this embodiment differs from the corresponding grip of the first embodiment only in that an axial small hole 28 is bored through the flat bottom near its outer circumferential edge.

A main body 1 is recessed to form an annular groove 9 and provide an abutment 32 for supporting bearing balls 21 in the radial direction. A hoop 20 is applied to a rotary member 29 as in the first embodiment but in the present embodiment, the rotary member 29 is not connected to a second grip 33 through the medium of the hoop 20. The interconnection between the two members 29 and 33 is accomplished by means of a coupling member 30 in the form of an annular resilient member, as will be described hereinafter. The second grip 33 has a rearward inner circumferential surface cooperative with the rotary member 29 to support the bearing balls 21, and in a cavity defined by the rearward inner circumferential surface, a cylindrical transmission member 34 is mounted not rotatably but axially movably with respect to the second grip 33, that is, in spline fashion, for example.

The coupling member 30 has a ring plate 35 and the ring plate 35 is disposed between opposing circumferential surfaces of the two members 29 and 33 as best seen in Fig. 5. Two tongues 36 integral with the ring plate 35 extend forwardly from the inner circumferential edge of the ring plate 35 at about 180° spaced circumferential positions and the ring plate 35 is recessed at diametrally opposite positions, 90° spaced apart from the tongues, to form two rearward projections 37. The tongues 36 are snugly fitted in recesses 38 formed in the second grip 33 and the rearward projections 37 are received in recesses 39 formed in the rotary member 29 when the jaws 2 clamp a tool T, as best seen in Figs. 4 and 7. The second grip 33 is formed with two sectoral recesses 40, each recess 40 having the half which makes an angle of about 60° to the center line of each recess 39.

In a cavity between the transmission member 34 and the first grip 27, there is disposed a pusher member 41 having a screw 43 in meshing engagement with a rearward shaft 42 of the main body 1. The direction of threading for the screw 43 is designed to be inverse to the direction of threading for the screws 7 and 8.

The pusher member 41 is formed with a small hole 44 which is axially aligned with the small hole 28 in the first grip 27, and the opposite projecting ends of a torsion spring 45 interposed between the first grip 27 and pusher member 41 are snugly fitted in the small holes 28 and 44.

The tool T is clamped as shown in Fig. 4 in accordance with the present invention. In order to move the jaws 2 from their released position to the illustrated clamping position, the grips 27 and 33 are relatively rotated in one direction as in the case of the first embodiment.

During this operation, as the second grip 33 rotates, the coupling member 30 having its tongues 36 snugly fitted in the recesses 38 in the second grip 33 is rotated to urge the projections 37 of the coupling member 30 against the side wall of the recesses 39 so as to eventually rotate the rotary member 29, thereby causing the screws 7 and 8 in meshing engagement with each other to advance the jaws 2 until they engage the tool T at the position illustrated in Fig. 4. During this advance of the jaws 2, the pusher member 41 is in intimate contact with the flat bottom of the first grip 27 by the action of the torsion spring 45.

Subsequently, as the second grip 33 continues to further rotate in the same direction, the jaws 2 push the rotary member 29 rearwardly and a resulting force is transmitted to the bearing balls 21 and transmission member 34 to mutually press the opposing surfaces of the transmission member 34 and pusher member 41, thereby ensuring that the pusher member 41 can rotate together with the transmission member 34 in opposition to the force of the torsion spring 45 under the influence of friction due to the mutual pressing. This rotation of the pusher member 41 cooperates with the action of the screw 43 to advance the pusher member 41 to the left, before the projections 37 of the coupling member 30 climb over the side wall of the recesses 39 in the rotary member 29 (with the ring plate 35 deflected within the sectoral recesses 40) to release the rotary member 29 from coupling with the second grip 33, thereby stopping the rotation of the rotary member 29. The advance motion of the pusher member 41 is transmitted to the rotary member 29 through the axially movable transmission member 34 and bearing balls 21, so that the rotary member 29 and the jaws 2 coupled thereto through the screws 7 and 8 are advanced from solid-line position to chained-line position in Fig. 6 to strongly clamp the tool T.

When releasing the thus clamped tool T, the second grip 33 is rotated in the other direction that is reverse to the previously-described direction. During this rotation, the rotary member 29 still remains to stop rotating but the action of the friction is mitigated, with the result that the pusher member 41 is assisted by the recovery force of the spring 45 to rotate in the reverse direction so as to recover its original position, thus removing the forward pushing force exerted by the pusher member 41 upon the rotary member 29. As the coupling member 30 is further rotated, the projection 37 return to the recesses 39 in the rotary member 29. With the projections 37 again received in the recesses 39, the rotation of the second grip 33 is

transmitted to the rotary member 29 to cooperate with the screws 7 and 8 in meshing engagement so as to retreat the jaws 2, thereby releasing the tool T completely and returning all members to the state before clamping.

In the present embodiment, a spring for forwardly urging the grip 33 may be inserted in a gap 46 between the outer circumferential periphery of the second grip 33 and the inner circumferential periphery of the cylindrical portion of first grip 27. Further, in order to increase friction between the opposing surfaces of the transmission member 34 and pusher member 41, a face ratchet or a friction shoe, for example, may be interposed between these surfaces.

Fig. 13 and 14 show a third embodiment.

In accordance with the third embodiment, a rotary member 65 is formed, at its forward surface, with a plurality of (three in the figures) sectoral recesses 66 and, at its rearward surface, with an annular step 67. A second grip 68 is made of plastic and formed with sectoral projections 69 which are fitted in the recesses 66. A hoop 70 fitted in a gap between the two members 65 and 68 by press fitting extends rearwardly, terminating in a rearward end which is stopped by a chip ring 71 mounted to the inner surface of the second grip 68. Bearing balls 21 are disposed in a cavity defined by the annular step 67, the hoop 70 and a support ring 72 provided on a portion, confronting the balls 21, of a main body 1.

A fourth embodiment as shown in Figs. 15 to 20 is a partial modification of the third embodiment and in the present embodiment, a buffer stop cylinder 75 is interposed between first and second grips 17 and 68.

The buffer stop cylinder 75 has a cylindrical main body 76 which has, at its forward outer circumferential edge, a flange 77 and, at its forward innner circumferential edge, a plurality of (three in the illustration) projections 78 which are slidably inserted in recesses 24 formed in the outer periphery of the second grip 68. As best seen in Figs. 17 and 20, the main body 76 is axially cut from the rearward end thereof to form a plurality of pairs (three pairs in the illustration) of radial cuttings 79, thus providing a plurality of (three in the illustration) pawls 80 at equal angular intervals. The rearward end of each resilient pawl 80 is formed with an engaging recess 81. A cylinder wall portion 83 intervening between adjacent resilient pawls 80 is formed, at its rearward end, with serrations 82.

An inner circumferential surface portion, facing the serrations 82, of the first grip 17 is formed with serrations 84 which are slidably engageable with the serrations 82. An annular projection 85 extending from the inner circumferential surface of the first grip 17 is engageable with the engaging recess 81.

In the third and fourth embodiments, clamping and releasing of the tool T can be effected through the same operation as in the case of the first and second embodiments and will not be described herein.

In connection with the fourth embodiment, Fig. 18 particularly illustrates the state before clamping. The clamping operation is started from this state by relatively rotating the first and second grips 17 and 68. During this operation, the buffer stop cylinder 75 is rotated together with the second grip 68 since the projections 78 of the buffer stop cylinder 75 are in engagement with the recesses 24.

After completion of clamping, the buffer stop cylinder 75 is pushed rearwards as shown at arrow in Fig. 18 so that the resilient pawls 80 are pushed down by the annular projection 85 so as to deflect downwards by their resiliency, thus permitting the projection 85 to engage the recesses 81 (Fig. 19) and the serrations 82 engage the serrations 84 to securely couple the two grips 17 and 68 together (Fig. 19).

Consequently, a rotary member 65 and a main body 1 are securely coupled together to guard the rotary member 65 against becoming loose and against providing insufficient clamping even when the rotary member 65 is vibrated during working operation performed using the chuck. This state shown in Fig. 19 can be returned to the original state shown in Fig. 18 by withdrawing the buffer stop cylinder 75 in the direction of arrow in Fig. 19.

Although particular preferred embodiments of the invention have been disclosed in detail for illustractive purposes, it will be recognized that variations or modifications of the disclosed apparatus are possible, which fall within the scope of the appended claims.

Claims

1. A chuck for tools comprising:

- a main body (1) in which an axial center hole (4) and a plurality of slanting holes (5) extending radially from said center hole are formed,
- a plurality of jaws (2) each being slidably inserted in each slanting hole (5) and formed at its outer surface, with a male screws (7);
- a rotary member (19; 29; 65) having a female screw (8) in meshing engagement with said male screws (7) and mounted in said main body (1) so as to be permitted for only rotation,
- a first grip (17; 27),
- a second grip (23; 33; 68) securely connected to said rotary member to coop-

erate therewith; and

- bearing balls (21), characterized in that said first grip (17; 27) is integrally connected to the rear end portion (25; 42) of the main body (1) so as not to be rotatable relative to said main body, said bearing balls (21) being interposed between the rear side of said rotary member (19; 29; 65) and the front side of an annular flange (22; 34; 72) at least rotatably secured to an intermediate portion of said main body, said rotary member (19; 29; 65) consisting of a plurality of divided segments which are put together by means of a hoop (20; 70).

2. A chuck for tools according to claim 1, characterized in that a buffer stop cylinder (75) is slidably mounted between said first and second grips (17; 68), and relative rotation between said first and second grips is permitted when said buffer stop cylinder is offset toward said second grip and said first and second grips are coupled together when said buffer stop cylinder is offset toward said first grip.

3. A chuck for tools according to claim 1, characterized in that said rotary member (29) and said second grip (33) are coupled together by a spring engaging means (30) able to release the engaging condition by raising rotative power, and in that a pusher member (41) is interposed between said annular flange, which is in the form of a transmission member (34), and said first grip (27), said pusher member (41) engaging said rear end portion (42) through a screw (43) which direction of threading is inverse to the direction of threading for said screws (7, 8) of said jaws (2) and rotary member (29), a torsion spring (45) being interposed between said pusher member (41) and said first grip (27) to couple said pusher member (41) and first grip (27) together, the arrangement being such that during clamping of the tool (T) by rotating the second grip (33) a reaction force is transmitted to the rotary member (29) causing the spring engaging means (30) to release the rotary member (29) from coupling to the second grip (33), thus stopping rotation of the rotary member (33) and displacing it rearwardly, and continuing rotation of the second grip (33) the pusher member (41) is caused to rotate together with said second grip (33) by the action of said transmission member (34) pressed against the pusher member (41) by the rotary member (29), thus advancing forward and pressing forward the rotary member (29), through the transmission member (34), causing the jaws (2) to clamp the tool (T) more tightly.

4. A chuck for tools according to claim 3, wherein said spring engaging means (30) is an annular coupling member made of resilient material, comprising a ring plate (35) secured to said second grip (33) and having projections (37) engageable with recesses (39) formed in the rotary member (29), said second grip (33) being formed with sectoral recesses (40) each centered with a corresponding recess (39) in said rotary member (29) and having a circumferential width which is larger than that of recesses (39).

Patentansprüche

1. Futter für Werkzeuge, umfassend:

- einen Hauptkörper (1), in welchem ein eine axiale Zentrumsbohrung (4) und eine Mehrzahl von geneigten Bohrungen (5), die sich radial von der Zentrumsbohrung erstrecken, gebildet sind,
- eine Mehrzahl von Backen (2), von denen jede in jeder geneigten Bohrung (5) verschiebbar eingesetzt ist und an ihrer äußeren Oberfläche mit einem Schraubengewinde (7) versehen ist;
- ein Drehteil (19; 29; 65), welches ein mit dem Schraubengewinde (7) in kämmendem Eingriff stehendes Muttergewinde (8) aufweist und in dem Hauptkörper (1) montiert ist, so daß es sich nur drehen kann,
- ein erster Griff (17, 27),
- ein zweiter Griff (23; 33; 68), der fest mit dem Drehteil verbunden ist, um mit diesem zusammenzuarbeiten; und
- Lagerkugeln (21), dadurch gekennzeichnet, daß der erste Griff (17, 27) fest mit dem hinteren Endteil (25, 42) des Hauptkörpers (1) verbunden ist, daß er relativ zum Hauptkürper (1) nicht drehbar ist, wobei die Lagerkugeln (21) zwischen der Rückseite des Drehteiles (19; 29; 65) und der Vorderseite eines Ringflansches (22; 34; 72) angeordnet sind und zumindest drehbar an einem Zwischenteil des Hauptkörpers festgehalten sind, und wobei das Drehteil (19; 29; 65) aus einer Mehrzahl von geteilten Segmenten besteht, die durch einen Ring (20; 70) zusammengesetzt sind.

2. Futter für Werkzeuge nach Anspruch 1, dadurch gekennzeichnet, daß ein Anschlag-

Zylinder (75) zwischen dem ersten und dem zweiten Griff (17; 68) verschiebbar montiert ist und relative Drehung zwischen dem ersten und dem zweiten Griff möglich ist, wenn der Anschlag – Zylinder zum zweiten Griff hin versetzt ist, und der erste und der zweite Griff zusammengekuppelt sind, wenn der Anschlag – Zylinder zum ersten Griff hin versetzt ist.

3. Futter für Werkzeuge nach Anspruch 1, dadurch gekennzeichnet, daß das Drehteil (29) und der zweite Griff (33) durch ein Feder – Eingriffsmittel (30) zusammengekuppelt sind, welches geeignet ist, die Eingriffsbedingung durch Erhöhung der Drehkraft zu lösen, und daß ein Schiebeteil (41) zwischen den in der Form eines Übertragungsteiles (34) ausgebildeten Ringflansches und dem ersten Griff (27) eingesetzt ist, wobei das Schiebeteil (41) in das Endteil (42) über eine Schraube (43) eingreift, deren Gewindegangrichtung entgegengesetzt zur Richtung der Gewindegänge von Schrauben und Muttergewinde (7, 8) der Backen (2) und des Drehteiles (29) ist, wobei eine Torsionsfeder (45) zwischen dem Schiebeteil (41) und dem ersten Griff (27) eingesetzt ist, um das Schiebeteil (41) und den ersten Griff zusammenzukuppeln, wobei die Anordnung so ist, daß während der Klemmung des Werkzeuges (T) durch Drehung des zweiten Griffes (33) eine Reaktionskraft auf das Drehteil (29) übertragen wird, die das Feder – Eingriffsmittel (30) veranlaßt, das Drehteil (29) von der Kupplung mit dem zweiten Griff (33) freizugeben, folglich die Drehung des Drehteiles (29) zu stoppen und es rückwärts zu verlagern, und bei Fortsetzung der Drehung des zweiten Griffes (33) das Schiebeteil (41) veranlaßt wird, sich mit dem zweiten Griff (33) unter Wirkung des vom Drehteil (29) gegen das Schiebeteil (41) gedrückten Übertragungsteiles (34) zu drehen, folglich durch das Übertragungsteil (34) das Drehteil (29) vorwärts zu verschieben und vorwärts zu drücken und die Backen (2) zu veranlassen, das Werkzeug (T) fester zu klemmen.

4. Futter für Werkzeuge nach Anspruch 3, dadurch gekennzeichnet, daß das Feder – Eingriffsmittel (30) ein aus federndem Material gefertigtes, ringförmiges Kupplungsteil ist, umfassend eine an dem Griff (33) befestigte Ringplatte (35), die Vorsprünge (37) aufweist, welche in am Drehteil (29) geformte Vertiefungen (39) einrastbar sind, wobei der zweite Griff (33) mit Sektorausnehmungen (40) versehen ist, von denen jeder gegenüber einer entsprechenden Vertiefung (39) im Drehteil (29) mittig ausgerichtet ist und eine Umfangsausdehnung hat, die größer ist als die der Vertiefung.

Revendications

1. Mandrin pour outils comportant :
- un corps principal (1) dans lequel sont formés un trou axial central (4) et plusieurs trous inclinés (5) s'étendant radialement à partir dudit trou central,
- plusieurs mâchoires (2) insérées chacune de manière coulissante dans chaque trou incliné (5) et ayant un pas de vis (7) mâle formé sur leur surface extérieure,
- un élément rotatif (19; 29; 65) ayant un pas de vis femelle (8) en prise avec ledit pas de vis mâle (7) et monté dans ledit corps principal (1) de manière à ne pouvoir que tourner,
- un premier élément de saisie (17, 27),
- un second élément de saisie (23; 33; 68) relié de manière ferme audit élément rotatif pour coopérer avec ce dernier, et
- des paliers à billes (21), caractérisé en ce que ledit premier élément de saisie (17, 27) est relié complètement à la partie (25, 42) formant extrémité arrière du corps principal (11) en formant un tout de manière à ne pas pouvoir tourner par rapport audit corps principal, lesdits papiers à billes (21) étant interposés entre le côté arrière dudit élément rotatif (19; 29; 65) et le côté avant d'une bride annulaire (22; 34; 72) fixée à une partie intermédiaire dudit corps principal de manière à pouvoir au moins tourner, ledit élément rotatif (19; 29; 65) étant constitué de plusieurs segments séparés qui sont réunis par l'intermédiaire d'une couronne (20, 70).

2. Mandrin pour outils selon la revendication 1, caractérisé en ce qu'un cylindre (75) formant butée à ressort est monté de manière à pouvoir coulisser entre lesdits premier et second éléments de saisie (17; 68), et en ce qu'une rotation relative entre lesdits premier et second éléments de saisie est permise lorsque ledit cylindre formant butée à ressort est décalé vers ledit second élément de saisie et lesdits premier et second éléments de saisie sont reliés l'un à l'autre lorsque ledit cylindre formant butée à ressort est décalé vers ledit premier élément de saisie.

3. Mandrin pour outils selon la revendication 1, caractérisé en ce que ledit élément rotatif (29) et ledit second élément de saisie (33) sont reliés l'un à l'autre par des moyens (30) de contact à ressort capables de libérer l'état de contact par augmentation de la puissance de rotation, et en ce qu'un élément (41) formant pousseur est interposé entre ladite bride annulaire qui constitue un élément (34) de transmission, et ledit premier élément de saisie (27), ledit élément (41) formant pousseur venant en prise avec ladite partie (42) formant extrémité arrière par l'intermédiaire d'un pas de vis (43) dont la direction du filetage est inverse à la direction du filetage desdits pas de vis (7, 8) desdites mâchoires (2) et de l'élément rotatif (29), un ressort de torsion (45) étant interposé entre ledit élément (41) formant pousseur et ledit premier élément de saisie (27) pour accoupler ledit élément (41) formant pousseur et ledit premier élément de saisie (27), l'agencement étant tel que pendant le serrage de l'outil (T) par rotation du second élément de saisie (33) une force de réaction est transmise à l'élément rotatif (29) entraînant les moyens (30) de mise en contact à ressort à libérer l'élément rotatif (29) de son accouplement avec le second élément de saisie (33), interrompant ainsi la rotation de l'élément rotatif (33) et le déplaçant vers l'arrière, et qu'en poursuivant la rotation du second élément de saisie (33), l'élément (41) formant pousseur est entraîné à tourner avec ledit second élément de saisie (33) par l'action dudit élément (34) de transmission appuyé contre l'élément (41) formant pousseur par l'élément rotatif (29), faisant ainsi avancer vers l'avant et poussant vers l'avant l'élément rotatif (29), par l'intermédiaire de l'élément de transmission (34), entraînant les mâchoires (2) à serrer plus fortement l'outil (T).

4. Mandrin pour outils selon la revendication 3, dans lequel lesdits moyens (30) de mise en contact élastique sont constitués d'un élément d'accouplement annulaire réalisé en matériau élastique, comportant une plaque annulaire (35) fixée sur ledit second élément de saisie (33) et ayant des saillies (36) pouvant être en prise avec des cavités (39) formées dans l'élément rotatif (29), ledit second élément de saisie (33) étant formé de cavités (40) en forme de secteur, chacune étant centrée par rapport à une cavité correspondante (39) dudit élément rotatif (29) et ayant une largeur circonférentielle qui est plus grande que celle des cavités (39).

FIG. 1
PRIOR ART

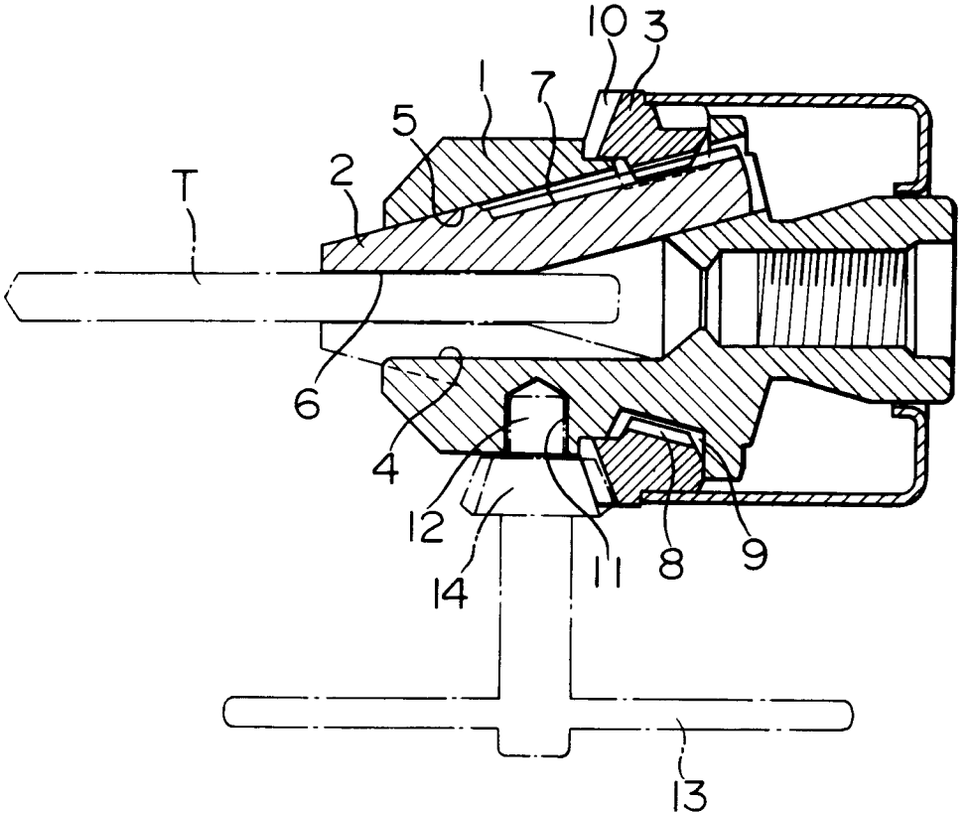


FIG. 2

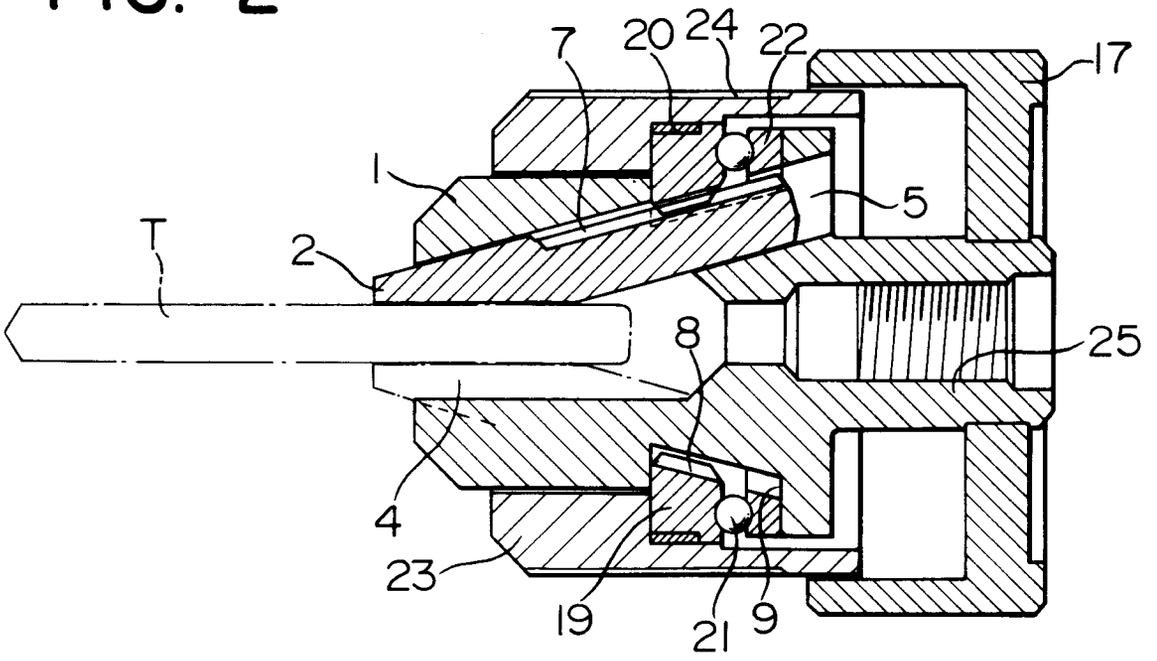


FIG. 3

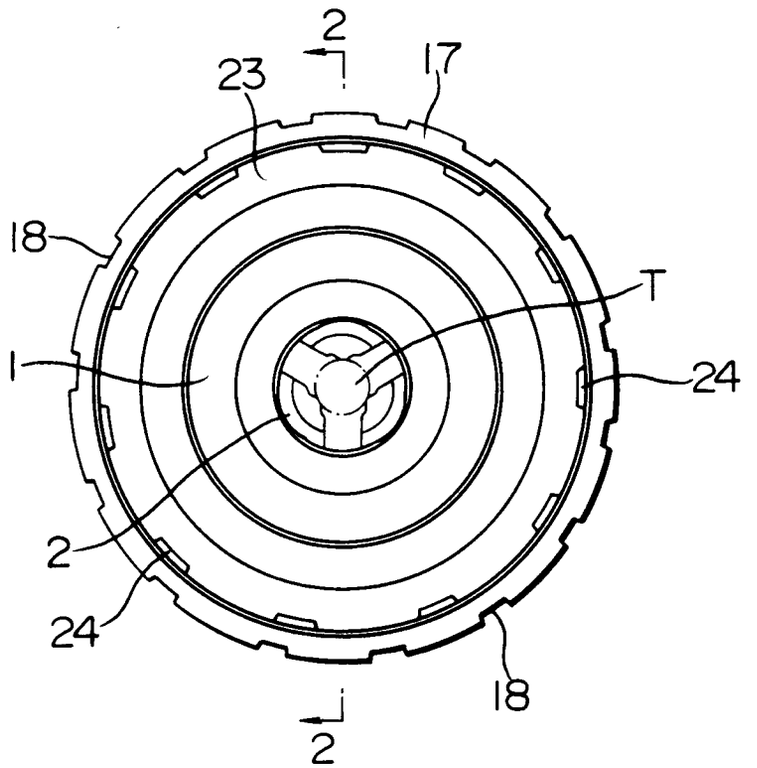

2
23
17
18
T
1
24
2
24
18
2

FIG. 4

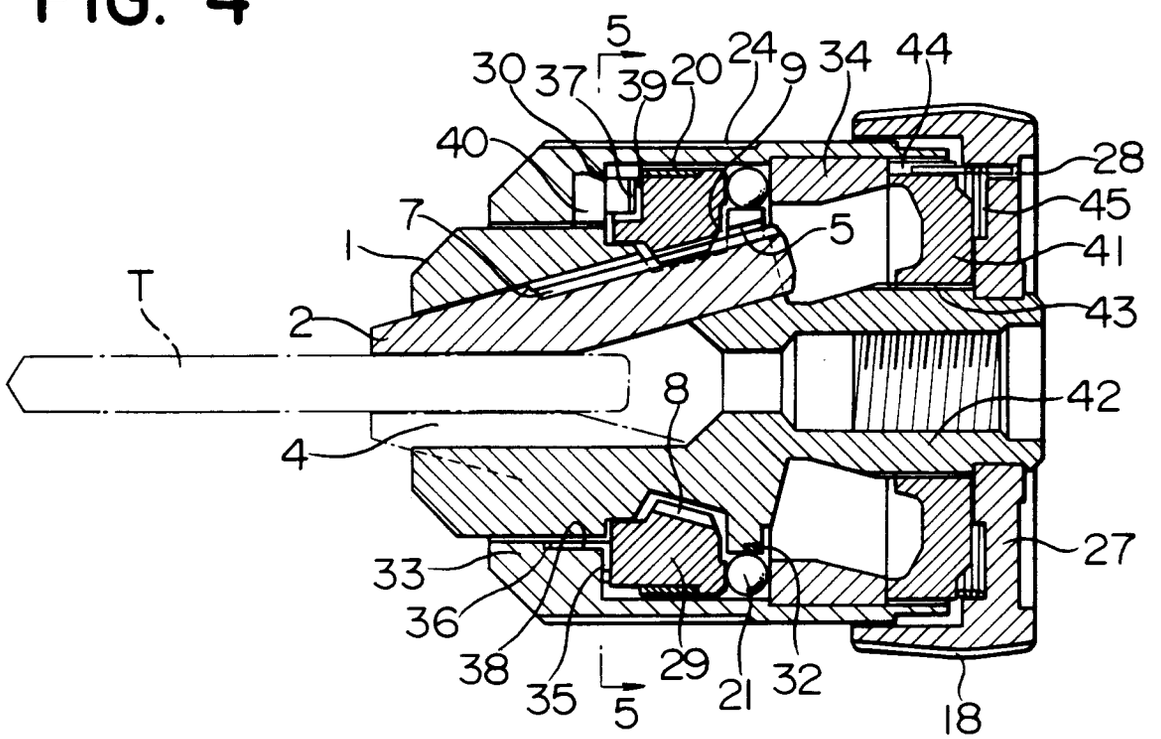

5
30
37
39
20
24
9
34
44
40
28
45
7
1
5
41
T
2
43
8
42
4
27
33
36
38
35
5
29
21
32
18

FIG. 5

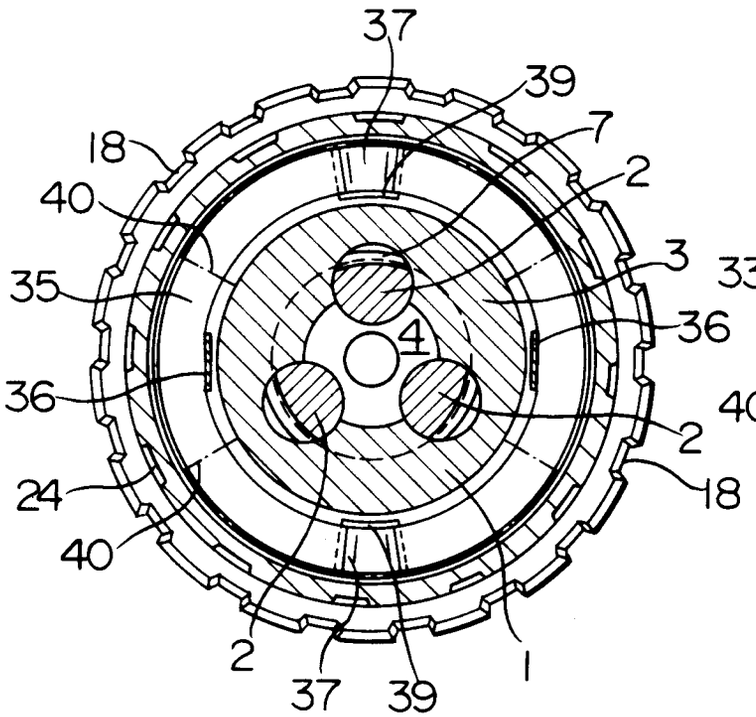


FIG. 7

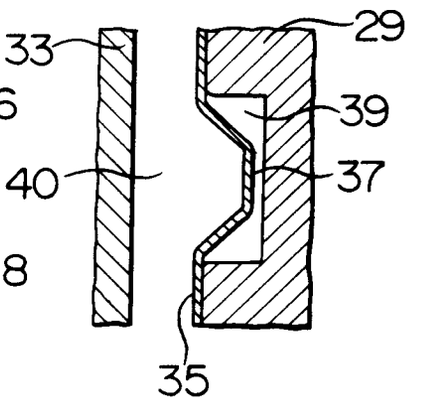


FIG. 6

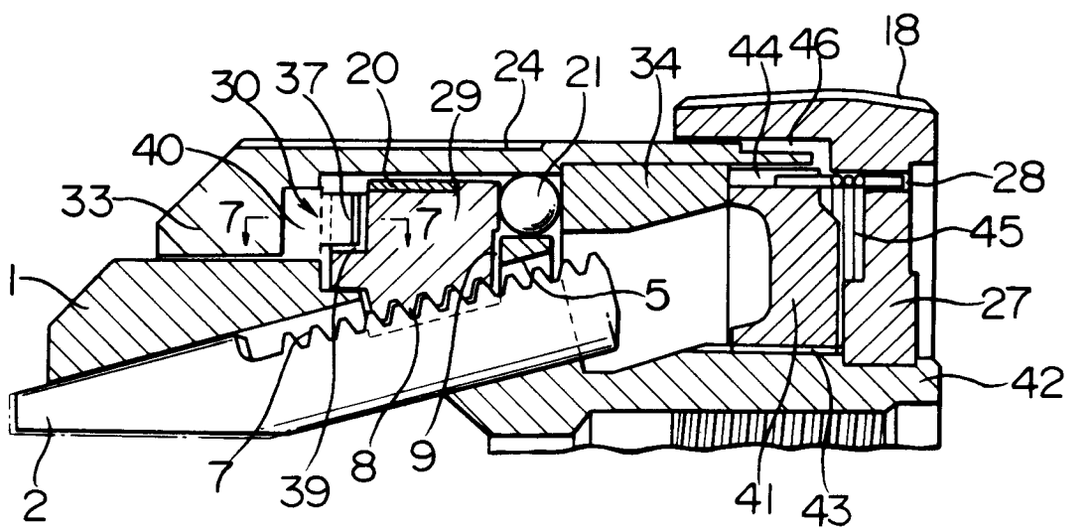


FIG. 13

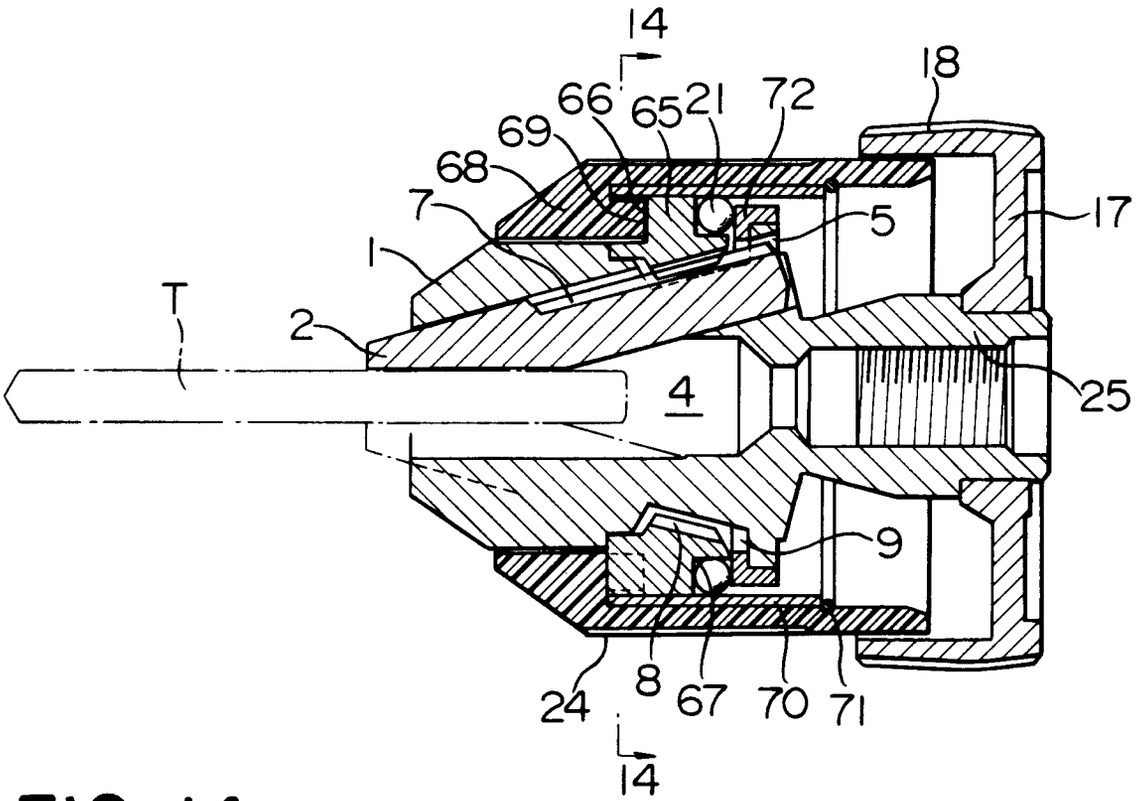
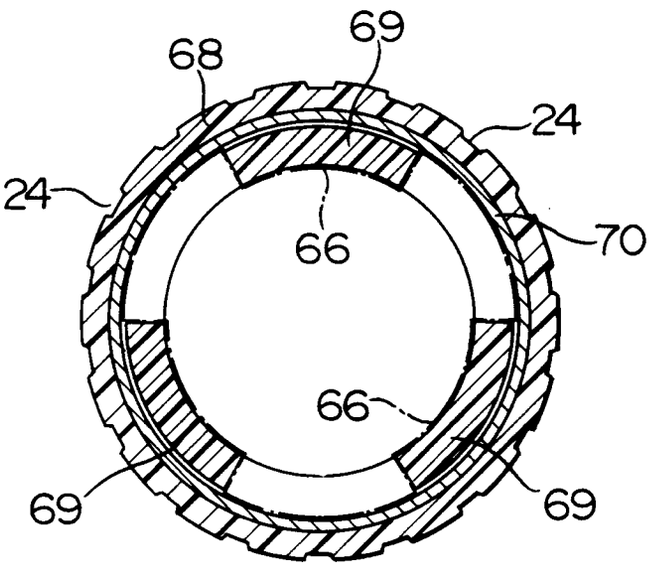

14
18
66
65
21
72
69
68
7
5
17
1
T
2
4
25
9
24
8
67
70
71
14

FIG. 14


69
68
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66
69
69

FIG. 15

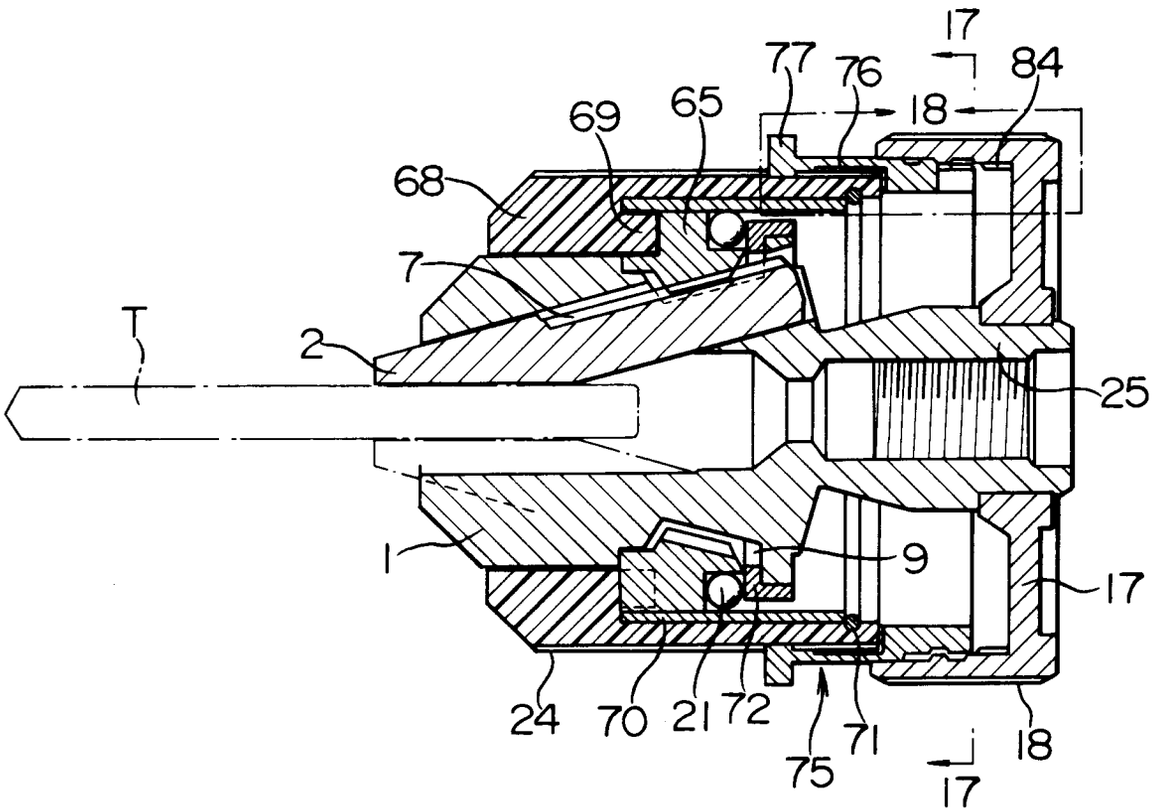
17
77
76
84
18
69
65
68
7
T
2
25
1
9
17
24
70
21
72
71
75
18
17

FIG. 16

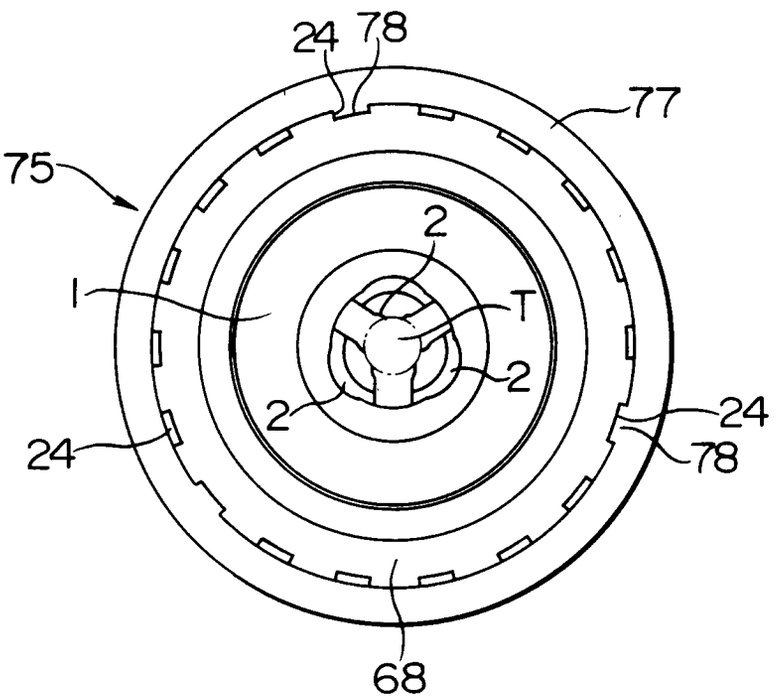
24
78
77
75
2
1
T
2
2
24
24
78
68

FIG. 17

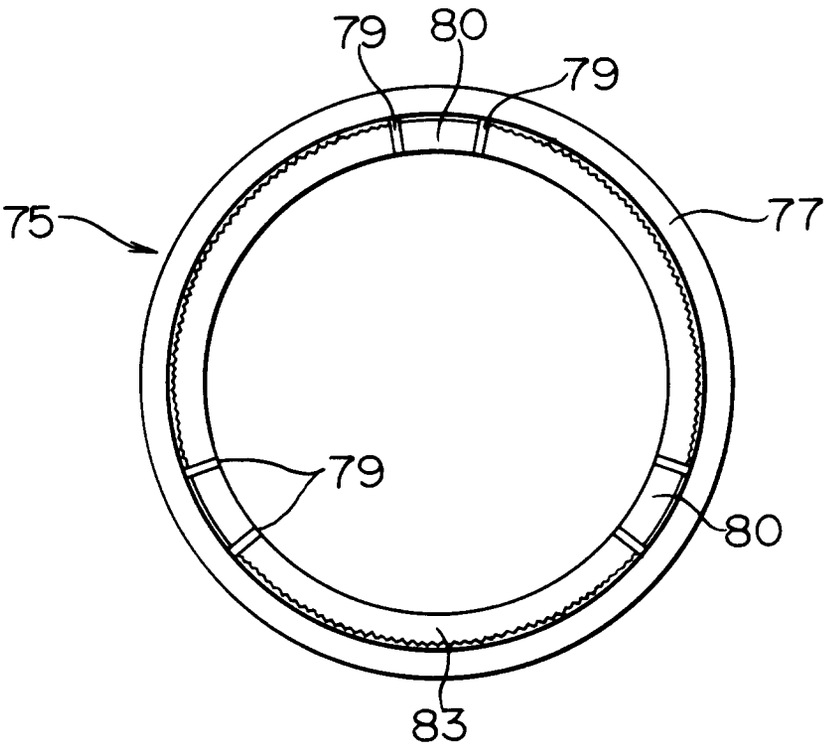

FIG. 18

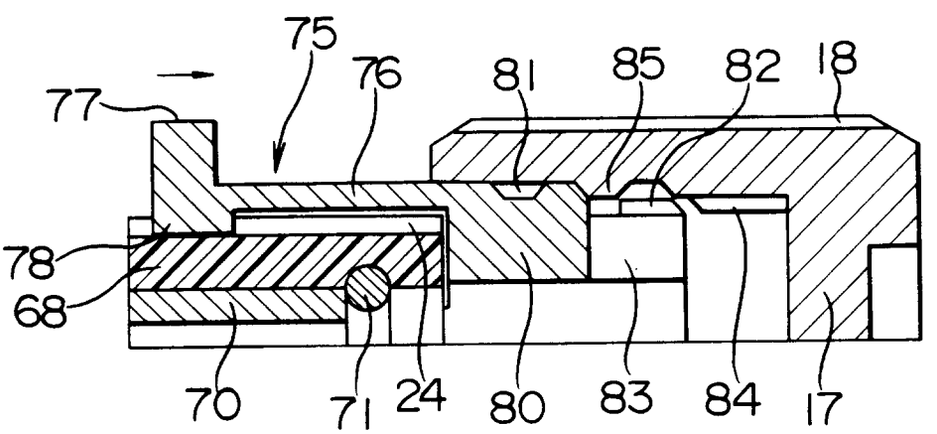

FIG. 19

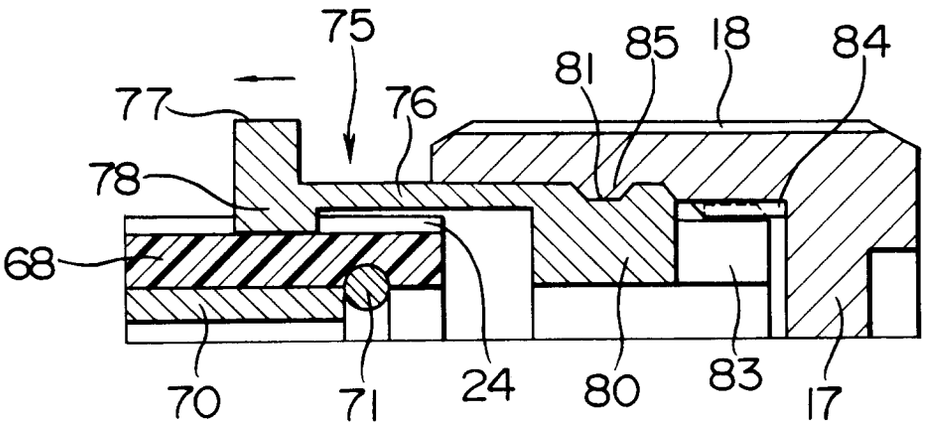

FIG. 20